

# Synthesis and Modeling Project of the U.S. Joint Global Ocean Flux Study (U.S.JGOFS ) The Role of Oceanic Processes in the Global Carbon Cycle

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## *Program Announcement*

*NSF 00-103*

DIRECTORATE FOR GEOSCIENCES  
DIVISION OF OCEAN SCIENCES

**DEADLINE(S): September 13, 2000**



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## SUMMARY OF PROGRAM REQUIREMENTS

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### GENERAL INFORMATION

**Program Title:** Synthesis and Modeling Project of the U.S. Joint Global Ocean Flux Study (U.S.JGOFS)

**Synopsis of Program:** The purpose of this Announcement is to invite innovative research proposals to augment the ongoing Synthesis and Modeling Project (SMP) of the U.S. Joint Global Ocean Flux Study (U.S.JGOFS). As part of a multinational oceanographic effort, U.S.JGOFS has as its primary objectives (1) the determination and understanding of processes controlling the biogeochemical cycling of carbon in the ocean and (2) the prediction of response of marine biogeochemical processes to climate change. Now in its fourth year, the SMP is focussed on the resolution of major unanswered questions during the course of U.S.JGOFS and related activities and on the modeling of the global ocean carbon cycle.

**Cognizant Program Officer(s):**

- Donald L. Rice, Chemical Oceanography Program, Division of Ocean Sciences, telephone: 703-306-1589, e-mail:[drice@nsf.gov](mailto:drice@nsf.gov).
- Phillip R. Taylor, Biological Oceanography Program, Division of Ocean Sciences, telephone: 703-306-1587, e-mail:[prtaylor@nsf.gov](mailto:prtaylor@nsf.gov).

**Applicable Catalog of Federal Domestic Assistance (CFDA) Number:**

- 47.050 --- Geosciences

### ELIGIBILITY INFORMATION

- **Organization Limit:** None
- **PI Eligibility Limit:** None
- **Limit on Number of Proposals:** None

### AWARD INFORMATION

- **Anticipated Type of Award:** Standard Grant
- **Estimated Number of Awards:** 7 - 10
- **Anticipated Funding Amount:** \$3M

# PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

## *A. Proposal Preparation Guidelines*

- **Proposal Preparation Instructions:** Supplemental Preparation Guidelines
  - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

## *B. Budgetary Information*

- **Cost Sharing Requirements:** Cost Sharing is not required
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

## *C. Deadline/Target Dates*

- **Letter of Intent Due Date(s):** None
- **Preproposal Due Date(s):** None
- **Full Proposal Due Date(s):** September 13, 2000

## *D. FastLane Requirements*

- **FastLane Submission:** Full Proposal Required
- **FastLane Contact(s):**
  - Kandace Binkley, Assistant Program Director, Division of Ocean Sciences, telephone: 703-306-1582, e-mail:[OCEFL@nsf.gov](mailto:OCEFL@nsf.gov).

## PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria apply.

## AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF Reporting Requirements apply.

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## I. INTRODUCTION

The Chemical Oceanography and Biological Oceanography Programs in the Division of Ocean Sciences hereby solicit research proposals to participate in the continuation of the Synthesis and Modeling Project (SMP) of the U.S. Joint Global Ocean Flux Study (U.S.JGOFS). As the last major activity of U.S.JGOFS, the SMP is open to U.S. scientists without past involvement in U.S.JGOFS as well as past and present U.S.JGOFS investigators.

Funding under this Announcement in FY 2001 is expected to be approximately \$3M, from which the Programs anticipate that 7 - 10 awards of up to four years' duration will be made. The deadline for proposal receipt at NSF is September 15, 2000. Award decisions will be made not later than March 1, 2001, which is the earliest possible start date.

To complete the topical coverage of the SMP and contingent upon the availability of funds, the Programs anticipate one more renewal of this Announcement in CY 2002 at a lower total level of funding. The 2002 deadline will be the final one for U.S.JGOFS.

Details of the scientific and implementation framework for the SMP are given in the U.S.JGOFS Science Plan for Synthesis and Modeling, which is available from the U.S.JGOFS Planning and Implementation Office, Woods Hole Oceanographic Institution, Woods Hole, MA 02543. The Plan is also available by Internet via the U.S.JGOFS Office homepage at <http://www1.who.edu/jgoofs.html>, which is also a valuable informational resource for tracking current and future U.S.JGOFS activities.

## II. PROGRAM DESCRIPTION

The international Joint Global Ocean Flux Study was organized in the mid-1980's with the twin goals of (1) determining and understanding the processes controlling time-varying fluxes of carbon and associated biogenic elements in the ocean and (2) predicting the response of marine biogeochemical processes to climate change. Organized as part of the U.S. Global Change Research Program, the U.S.JGOFS program has contributed to these goals through three types of studies:

- Regional processes studies designed to estimate geochemical inventories, fluxes, and process kinetics of direct relevance to oceanic carbon cycling. The North Atlantic Bloom Experiment (NABE), The Equatorial Pacific Process Study (EqPac), the Arabian Sea Process Study (ASPS), and the Southern Ocean Process Study (AESOPS) have been concluded, although scholarly production is continuing.
- Oceanic time-series stations for the study of annual to decadal phenomena relevant to the marine carbon cycle and to sea-air exchange of carbon dioxide. The Hawaii Ocean Time Series (HOT) and the Bermuda Atlantic Time Series (BATS) have been operating continuously since the start of U.S.JGOFS. Work at BATS has also included bio-optical research sponsored by NASA.
- A global marine carbon dioxide survey, co-sponsored by DOE and NOAA, to achieve improved estimates of sea-air CO<sub>2</sub> exchange and of anthropogenic CO<sub>2</sub> inventories.

The central goal of the SMP is to synthesize results from these (and related) efforts into a set of models that can be used for prediction. Model development should be driven by data (including satellite data) and synthesis efforts should be undertaken with an eye to their utility for model development.

To help structure an approach to this central goal, the U.S.JGOFS Steering Committee has organized the SMP conceptually around three elements: (1) global and regional balances of carbon and related biologically active substances; (2) local carbon balances and their mechanistic controls; and (3) extrapolation and prediction. These elements are not stand-alone enterprises, but rather heuristics or points of departure that should support and point to one another.

### 1. Global and Regional Carbon Balances

The U.S.JGOFS database affords an unprecedented opportunity to develop regional and global mass balances for carbon and other substances with cycles linked with the carbon cycle. The global marine carbon dioxide survey offers a particularly attractive dataset for study. But how does one utilize the survey data, which have extensive spatial coverage but are not synoptic? How can global models be related to the observational databases generated by process studies and the oceanic time-series stations? How do anthropogenic inputs affect -- and how can they be expected to affect -- global carbon inventories and mass fluxes? These are only a few of the global-scale questions and challenges that need to be addressed in the SMP.

### 2. Local Carbon Balances and Mechanisms

Modeling the major mechanisms responsible for observed local inventories and fluxes of carbon and other substances is essential to the development of larger-scale models. There is therefore a need for mass balances for carbon and other associated substances at the process study and time-series sites as well as quantification of the principal controlling mechanisms. How are these mechanisms expressed spatially and temporally? How can these mechanisms and their interactions be parameterized to facilitate regional and global synthesis and modeling? Experience to date suggests that understanding the interdependencies of such mechanisms often, if not generally, requires resolution at the levels of production and export in the euphotic zone, transport and remineralization in the deep ocean, and diagenetic transformation in seafloor sediments.

### 3. Extrapolation and Prediction

To achieve the original objectives of JGOFS, observations made at small spatial and temporal scales must be scaled upwards to regional/global spatial scales and to seasonal/annual time scales - and beyond. This element of the SMP will draw upon other components to understand and predict aspects of the cycling of carbon and other biologically-active substances in the past, present, and future ocean.

### Major SMP Research Trajectories

Realizing the research goals of the SMP and, more generally, the fundamental objectives of U.S.JGOFS will require the coordinated efforts of a wide variety of investigators, both modelers and observationalists. The organization of principal investigators and proposals by teams and the continual interaction of teams with one another will be vital to the success of the SMP.

As the U.S. JGOFS Synthesis and Modeling Project nears completion, the foci for the program are being refined to highlight emerging new scientific directions as well as remaining unresolved elements of the original implementation plan. To address the overall objectives of the project, a major emphasis for this funding round will be on the global-scale ocean carbon cycle. Synthesis and modeling efforts that integrate across individual data sets, processes, and geographic regimes and that effectively combine field data sets and regional- to global-scale models are encouraged. Highest priority will be given to proposals addressing the following topics:

- Development, evaluation and incorporation of mechanistically based, biological models for global carbon cycle simulations.
- Data based evaluation of coupled global physical/biogeochemical models.
- Response of ocean biogeochemistry to past and future climate change -spatial and temporal extrapolation of biogeochemical flux estimates (e.g. export production) from local to basin and global scales.
- Synthesis and modeling studies of the Arabian Sea, Southern Ocean, North Atlantic, ocean margins (with respect to role in basin to global-scale carbon cycle), and the set of U.S. and international time-series stations data.
- Primary production, new production, export production and elemental composition (both particulate and dissolved).
- Biogeochemical effects of trace metal cycling.
- Controls and distributions of calcium carbonate and silicate production, transport and remineralization.
- The mechanisms and rates of mid to deep water particle flux and remineralization as well as sediment diagenesis.
- Applications of remote sensing data to the ocean carbon cycle.

### **III. ELIGIBILITY INFORMATION**

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

### **IV. AWARD INFORMATION**

Under this announcement, grants may be awarded in a variety of sizes and durations. NSF expects to fund approximately 7 to 10 standard awards depending upon the quality of submissions and the availability of funds. Awards of up to four years duration will be considered if the justification and promise are compelling. Approximately \$3 million will be available for this initiative in FY 2001.

### **V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS**

#### **A. Proposal Preparation Instructions**

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG) (NSF 00-2). The complete text of the GPG (including electronic forms) is available electronically on the NSF Web Site at: <http://www.nsf.gov/pubs/2000/nsf002/start.htm>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Investigators intending to submit proposals are requested to submit a brief statement of scope to:

Synthesis and Modeling Project U.S.JGOFS Office Woods Hole Oceanographic Institution  
Woods Hole, MA 02543 FAX: 508-457-2161

Proposers are reminded to identify the program announcement/solicitation number (NSF 00-103) in the program announcement/solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

### **B. Budgetary Information**

Cost Sharing is not required in proposals submitted under this Program Announcement .

### **C. Deadline/Target Dates**

Proposals submitted in response to this announcement must be submitted by 5:00 PM, local time on the following date(s):

September 13, 2000

### **D. FastLane Requirements**

Proposers are required to prepare and submit all proposals for this Program Announcement through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call 1-800-673-6188.

*Submission of Signed Cover Sheets.* The signed copy of the proposal Cover Sheet (NSF Form 1207) must be postmarked (or contain a legible proof of mailing date assigned by the carrier) within five working days following proposal submission and be forwarded to the following address:

National Science Foundation  
DIS – FastLane Cover Sheet  
4201 Wilson Blvd.  
Arlington, VA 22230

## **VI. PROPOSAL REVIEW INFORMATION**

### **A. NSF Proposal Review Process**

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgements.

#### **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

#### **What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration in making funding decisions.

#### ***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can

engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

### ***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens - women and men, underrepresented minorities, and persons with disabilities - is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A summary rating and accompanying narrative will be completed and signed by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are mailed to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

### **B. Review Protocol and Associated Customer Service Standard**

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail Review followed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at its own risk.

## **VII. AWARD ADMINISTRATION INFORMATION**

### **A. Notification of the Award**

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program.

Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI. A, for additional information on the review process.)

## **B. Award Conditions**

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)\* or Federal Demonstration Partnership (FDP) Terms and Conditions \* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

\*These documents may be accessed electronically on NSF's web site at [http://www.nsf.gov/home/grants/grants\\_gac.htm](http://www.nsf.gov/home/grants/grants_gac.htm). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO web site at <http://www.gpo.gov>.

## **C. Reporting Requirements**

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

## VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries should be made to the Synthesis and Modeling Project of the U.S. Joint Global Ocean Flux Study Program:

- Donald L. Rice, Chemical Oceanography Program, Division of Ocean Sciences, telephone: 703-306-1589, e-mail:[drice@nsf.gov](mailto:drice@nsf.gov).
- Phillip R. Taylor, Biological Oceanography Program, Division of Ocean Sciences, telephone: 703-306-1587, e-mail:[prtaylor@nsf.gov](mailto:prtaylor@nsf.gov).

For questions related to the use of FastLane, contact, Kandace Binkley, Assistant Program Director, Division of Ocean Sciences, telephone: 703-306-1582, e-mail:[OCEFL@nsf.gov](mailto:OCEFL@nsf.gov).

## IX. OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding for research and education in science, mathematics, and engineering. The NSF Guide to Programs is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF [E-Bulletin](#), which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's [Custom News Service](#) (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

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receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation or contact the program coordinator at (703) 306-1636.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 306-0090, FIRS at 1-800-877-8339.

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## **PRIVACY ACT AND PUBLIC BURDEN STATEMENTS**

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 - 17th Street, N.W. Room 10235, Washington, D.C. 20503.

*OMB control number: 3145-0058.*